

## WORK ON CANTONMENT SETS BUILDING RECORD

Barracks Go Up At Rate of One  
Every Forty Minutes—Speed  
Surprises Carpenters Them-  
selves

### ALL KNOCK-DOWN CONSTRUCTION

All rapid-fire construction records have been broken at the Camp Dix cantonment, as a result of the splendid organization of 7000 men formed by Irwin and Leighton within the short period of five weeks. Mechanical ability, supported and guided by modern efficient business practice, made it possible to build barracks so rapidly as to surprise the hustling army men in charge.

Engineers entered the field and located the site, after which carpenters erected batter boards and lines. Laborers then appeared with long handled shovels and dug the foundation post holes. They were followed by the carpenters, who set the poles and sawed them off at the proper elevation. Girders and sills were then placed on the posts, after which joists for the first floor were unloaded into proper position directly from the wagons.

While the joists were being set the framing for the side and end walls was unloaded and put together ready to be raised, each side a completed unit. All framing was cut at the framing yard and delivered ready to erect without additional fitting, as is customary in structural steel buildings.

Immediately after this operation was completed, the second floor joists were delivered and placed into position, as in the first floor, and carpenters began covering the exterior walls with siding, which had previously been cut to fit.

The floor was laid on the second floor and columns erected, carrying purlines and ridge pole while the work of siding was in progress. The rafters were set and the roof completed by the time the siding reached the eaves. As soon as the first-story window sills were reached additional carpenters started putting in window sills and sash.

The necessary number of ventilators were made up in units at the yard and set in place before being covered with paper. Hoods for the window were finished complete with paper before erection. Cleaning up was in progress at all times, even to the removal of tail grass before any lumber was used in the building in accordance with the stringent orders issued by the government in this respect. Boys with new sanitary water pails circulated among the men at all times with cool water.

A careful study of barrack building, commonly termed "knock-down construction," has developed the fact that 15,000 feet of lumber can be worked up daily by twenty-five carpenters. Nearly 1,000,000 feet of lumber is used daily in the nine sections of the cantonment.

This material is carted from the railroad sidings by twenty-five Peerless army trucks brought here for service on the Mexican border for the purpose. They average about 1000 feet of lumber a trip and make ten trips a day. One hundred and fifty teams are also used for carting supplies.

It has been a herculean task to perfect an organization to carry on cantonment work here so splendidly. It required some forethought to provide food and housing for the men, as erecting and occupying quarters has to be done simultaneously, but it was done, and President Wilson, as commander-in-chief of the army and navy may justly feel pleased with what is being accomplished at Camp Dix.

### HARVARD AMBULANCE DRIVER KILLED IN FRANCE

Paul Cody Bentley, Harvard '17, is dead at the French front, according to despatches just received from Paris. He was injured on Friday last when a shell exploded under an ambulance he was driving. Bentley was 22 years old and lived in Chicago. He prepared for college at the Chicago University High School, and spent one year at the Chicago University.

## JAPANESE MISSION REVIEWS AVIATORS DURING OFFICIAL VISIT TO INSTITUTE

INSTITUTE BUILDINGS, 4.15 P. M.—The Japanese mission, consisting of Viscount Ishii, Ambassador Sato, Admiral Takeshita, General Sugano, escorted by Mayor Curley and Dr. Norman Prince, chairman of the Mayor's reception committee have arrived to inspect the Institute buildings. The party was received at the Institute at the Copernicus pylon by Mr. F. R. Hart, treasurer of the Institute; Professor A. E. Kennelly chairman of the faculty; Professor A. E. Burton, Dean; Professor A. L. Merrill, secretary of the faculty; Professor C. H. Peabody in charge of Dept. of Naval Architecture; Bursar Ford, and Mr. G. Wigglesworth, Col. T. L. Livermore, Mr. A. F. Estabrook, Mr. J. W. Rollins, members of the executive committee of the corporation.

Before entering building 4 by the Lavoisier entrance the mission inspected the cadets of three of the government schools established at the Institute, Captain F. Seydel, U. S. A. of the Cadet School of Military Aeronautics, Captain J. P. Parker, N. N. V. of the Cadet School of the First Naval District, and Lieutenant E. S. McKittrick, U. S. N. of the School of Naval Aviation, headed their respective detachments drawn up at attention in the Great Court.

SOUTH STATION, 10 A. M.—Boston gave the visiting Japanese mission a warm welcome upon its arrival here today.

Rain failed to dampen the desire of Bostonians to see the distinguished personages from the Far East, and a large-sized crowd was assembled at the South station when the party arrived.

Mayor Curley and a committee of citizens welcomed them upon their arrival and extended the official greetings. The South station was alive with Japanese flags and the faces of the visitors beamed.

With special details of marines and state guardsmen acting as a military escort, the party rode, in automobiles, together with Mayor Curley and the committee, through down town streets. They received a splendid reception as they passed along. The large number of Japanese flags waving from buildings on either hand was specially pleasing to the visitors.

The column proceeded to the State House for Gov. McCall's address of welcome in behalf of the state of Massachusetts the first event on the day's official program.

## READY FOR NEW TERM

Institute Buildings Prepared For  
Record Freshman Class

Following a summer of unprecedented activity, the Institute now stands fully prepared for the opening of the coming term. The Juniors returned from their military camp at Machias, Maine, last Saturday to resume their studies here next week. Members of the other classes are drifting in daily, while about six hundred men are at present attending the various government schools instituted during the summer.

Those returning will find a number of improvements, but no radical changes in the buildings. In order to afford better facilities to the government chemical research work, one or two of the conference rooms have been divided and turned over to this work.

The army aviators are living in building 1. The Walker Memorial, uncompleted last year, is not yet to be open to the student activities as the naval aviators, and the Naval Plattsburg are housed there. The activities will be found in the wooden structure on Massachusetts avenue, formerly used by Stone and Webster. The flag poles donated by the Alumni have been placed at the entrances of Lowell and DuPont Courts. Because of the need for more space, the wooden shacks at the rear of the grounds near the power plant will be used as airplane motor laboratories, while a new shed has been constructed for the setting up and dissection of air and seaplanes. A machine gun pit has been placed on the grounds for practice in the manipulation of this firearm. Shrubbery and trees have been planted, and the ten acres in the rear of the buildings has been leveled off which will serve both as a parking space for autos and as a parade ground.

### COLUMBIA EXCLUDES STUDENT WITH SOCIALISTIC LEANINGS

NEW YORK, Sept. 17.—Columbia University was well within its rights when it excluded as a student there Leon Samson after he had addressed a meeting where Emma Goldman was the chief speaker, according to a decision today in the State Supreme Court, denying a motion for an injunction sought by Samson restraining the college authorities from preventing his attendance.

The court ruled "the inevitable close contact that would place Samson with impressionable young men of his own age who might thus be inoculated by him with the poison of his disloyalty would constitute a menace to the university."

## HOUSE INCREASES SUMS FOR ORDNANCE DEPARTMENT

Fails to Reach Final Vote on Seven  
Billion Dollar Bill

WASHINGTON, Sept. 17.—The House today failed to reach a final vote on the \$7,000,000,000 urgent deficiency bill consideration of a section providing additional funds for the war department consuming virtually the entire day. Many amendments increasing the sums proposed in the original bill were approved.

The secretary of war was authorized to incur obligations aggregating \$100,000,000 for ordnance and ordnance supplies in addition to appropriations made or pending, but the proposed \$3,000,000 for an ordnance proving ground at Kent island, Chesapeake bay, was eliminated from the bill.

Increases in the measure agreed to include the ordnance stores and supplies from \$70,600,000 to \$73,520,000; small arms target practice from \$2,000,000 to \$13,000,000, and automatic machine rifles from \$120,277,000 to \$220,277,000, with an increase in an additional authorization for such rifles from \$50,000,000 to \$118,020,000.

An appropriation of \$676,213,000 for mountain, field and siege cannon was increased to \$695,100,000 and that for ammunition for such cannon was raised from \$700,000,000 to \$777,182,750.

Appropriations of \$16,750,000 for armored motor cars, with authority to contract for \$5,000,000 more, and of \$700,000 for submarine mines also were approved.

### MORATORIUM URGED FOR ENLISTED MEN DURING WAR

"Soldiers' and Sailors' Civil Rights  
Bill" Already Framed

WASHINGTON, Sept. 17.—Legislation to protect the civil and property rights of soldiers in effect a moratorium for the duration of the war in behalf of men who are serving their country on the firing line, may be placed on the administration's program for the session of Congress as a necessary element of the raising of a citizen army.

The "soldiers' and sailors' civil rights bill" to carry out this purpose already has been introduced in both houses, having been framed in the office of Judge Advocate-General Crowder.

It is proposed that creditors' suits against officers or men may be held up and judgment by default denied, the framers of the bill recognizing that a man in the army or navy would have no opportunity to make his defence in person or to arrange for its proper hearing through the counsel. It would set aside the statute of limitations, so that a debt owed to a soldier might not be outlawed in his absence.

There will be a meeting of the news staff of The Tech in the Tech office Thursday morning at 10.00 o'clock.

## INSTITUTE STARTS NEW CO-OPERATIVE COURSE WITH G. E. CO.

Course VI-A Will Graduate Electrical Engineers  
After Five Years With Degree of  
Master of Science

### SPLIT TIME BETWEEN CAMBRIDGE AND LYNN

A COURSE in Industrial Electrical Engineering has been started at the Institute, similar to that already in operation in Course X. A five-years' course, the last three years being divided between classes at the Institute and practical experience at the Lynn shops of the General Electric Co., will graduate electrical engineers from Course VI-A with the degree of Master of Science.

It has been the constant endeavor of President MacLaurin to bring the Institute into the closest touch with the industrial world. More and more in the different departments there have been selected lines of work which shall introduce experience and actual practice of the professions taught, and this has been accomplished by relationships with commercial enterprises which permit study and investigation in large manufacturing establishments. The latest of these cooperative enterprises, known as Course VI-A, is that which has been undertaken jointly by the Institute and the General Electric Company. This is a proposition which on the side of the students gives to them the advantages that an enormous industrial plant with its methods and problems will afford and at the same time the General Electric will reap the benefit of the services of a group of selected young men with the broad educational foundation that Technology insists upon and the special training that the Lynn shops are well fitted to give. These students will find themselves placed instantly on the completion of their school work, while the company will have at its disposal for its own business the services of men technically trained whose thoughts and energies have for a number of years been focussed on the processes and problems peculiar to the manufacture of electrical devices.

The cooperation is different in its nature from the other ones that the Institute has entered into. The chemical experience courses which have been pursued the past year in five great manufacturing centres, each one fundamentally different in the principles of its work from the others, give to the students in chemistry an actual knowledge of numerous processes, making of them well-rounded industrial chemists. The corporations receive the benefit of different groups of keen young minds looking sharply into their different processes. The cooperation with the U. S. Smelting, Refining and Mining Co. gives to the corporation the advantages of the co-ordinated research that the vast laboratories of Technology afford, and to the Institute the opportunity to manage its laboratories on a more efficient basis by using them a greater percentage of the time.

The new course in electrical engineering lies in a somewhat different line from the others. Its object is the training of leaders for engineering and administrative branches of electrical and related industries. The course affords a distinctive training for technical and executive responsibilities with manufacturing corporations, and particularly electrical ones. The course covers a period of three years of cooperative engineering and administrative training, and the requirements for entrance into the course are the completion of work equivalent to the first two years of the Electrical Engineering Course at the Institute. This equivalency is obtained by college students who take their Bachelor of Arts or Bachelor of Science Degree while specializing in mathematics and physics, as well as by pursuing the first two years of the Electrical Engineering Course at Technology. Consequently, such college graduates who are prepared to enter the third year of the Electrical Engineering course of the Institute, as well as students who have satisfactorily completed the first two years of the Electrical Engineering course at the Institute or its equivalent elsewhere, are eligible for this new course.

(Continued on Page 2)

### FIRST SHIPPING SCHOOL GRAD GETS HIS LICENSE

The first man to complete two months of special sea service as an extra junior officer, on graduating from the United States Shipping Board's free Government navigation school at the Institute, is Charles W. Hacking of 10 Washington street, Stoneham, who yesterday received his license from the Steamboat Inspection Service. He is now free to become an officer in the American merchant marine.

Hacking enrolled in the free Government navigation school less than three months ago. He completed his course in six weeks, and then went to sea.

The first class to graduate from the free Government navigation school at Provincetown will take examinations for licenses before the Steamboat Inspectors today in this city.

## EXAMS ON THIS WEEK

Last Papers Will Be Given  
Thursday Afternoon

The regular September examinations for entrance, condition, and advanced standing have been in progress since last Thursday, and will continue through the coming Thursday. The schedule follows:—

| Wednesday, September 19    |      |          |       |
|----------------------------|------|----------|-------|
|                            | Time | Building | Rooms |
| Banking Ec. 37 (2)         | 2-5  |          | 3-440 |
| Chemistry 501, 502† (1)    | 2-5  |          | 3-416 |
| Descriptive Geometry†      |      |          |       |
| D21, D23 (2)               | 2-5  |          | 3-440 |
| Elect. Engineering 616 (3) | 9-11 |          | 3-480 |
| Elect. Eng. III 603 (3)    | 2-5  |          | 3-460 |
| Field 1234 (3)             | 9-12 |          | 3-460 |
| Geology, Struct. and       |      |          |       |
| German II I21 (1)          | 2-4  |          | 3-410 |
| Mathematics M22 (2)        | 9-12 |          | 3-440 |
| Mech. Drawing† D11, D12,   |      |          |       |
| D14 (1) (first part)       | 9-12 |          | 3-410 |
| Naval Arch. 1301 (3)       | 9-12 |          | 3-460 |
| Ore Deposits 1251 (2)      | 2-4  |          | 3-440 |
| Phys. Metallurgy 508 (3)   | 2-4  |          | 3-460 |
| Precision of Meas. 803 (2) | 2-4  |          | 3-440 |
| Quan. Analysis 514 (3)     | 9-12 |          | 3-460 |
| Structures 140, 141 (3)    | 2-5  |          | 3-460 |
| Transportation Ec. 35 (3)  | 9-12 |          | 3-460 |

| Thursday, September 20   |      |  |       |
|--------------------------|------|--|-------|
| Bank. & Fin. Ec. 36 (3)  | 9-11 |  | 3-460 |
| Business Law Ec. 60 (3)  | 2-4  |  | 3-460 |
| Descriptive Geometry     |      |  |       |
| D16, D16a, D18 (1)       | 9-12 |  | 3-410 |
| Des. Geom.† D15, D16,    |      |  |       |
| D16a, D18 (1)            | 9-12 |  | 3-410 |
| Electrical Engn. El. of  |      |  |       |
| 601 (2)                  | 9-11 |  | 3-460 |
| English Literature E22,  |      |  |       |
| E24 (2)                  | 2-4  |  | 3-440 |
| English E34 (3)          | 2-4  |  | 3-440 |
| Mech. Drawing† D11, D12, |      |  |       |
| D14 (continued) (1)      | 2-5  |  | 3-410 |
| Quan. Analysis 512 (2)   | 9-12 |  | 3-440 |
| Quan. Analysis 513 (2)   | 9-12 |  | 3-440 |
| Railroad Engin.* 121 (3) | 9-12 |  | 3-430 |

\*second term only.  
†For advanced standing applicants only.

WASHINGTON, Sept. 15.—The Liberty Motor produced by engineers working under the direction of the War Department will be used also in naval aircraft.

# The Tech

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TUESDAY, SEPTEMBER 18, 1917

WITH the opening of a new school year there is some conjecture on the part of the faculty as to how soon the men will settle down to serious work and display a spirit of interest and enthusiasm. If ever before in a man's school life this spirit should make itself manifest it is this year. It is not exaggerating the situation to say that we at the Institute are a privileged few. If we are going to let the older young men of the nation go out and fight our battles until we can become officer brothers in arms then it is the very least we can do to start in this year's work with the idea that we are going to make the greatest effort to fit ourselves mentally and physically to take our places in the fighting line. Let there be no evidences of shiftless indifference, of bluffing and procrastination. In short the petty vices students are addicted to have no place in the class room when the nation is at war. Our time is not our own to squander and fiddle as we will. A man who has not come to the Institute this year to get the most out of his work as possible is a slacker and does not deserve the right to say that he is even of potential help in winning the war.

## PROVIDENCE TO HAVE MARINE SCHOOL

Henry Howard, director of recruiting for the United States shipping board, has decided to start another navigation school at Providence to continue the work of the first school in that city. New students possessing qualifications will be admitted the first and third Mondays of every month. C. H. Tunney of Southboro will continue as chief instructor.

## INSTITUTE STARTS NEW JOINT COURSE WITH G. E. CO.

(Continued from Page 1)

The three years of cooperative instruction are equally divided between courses under the faculty at the Institute in Cambridge and employment under special foremen instructors at the Lynn works and vice versa. These two groups of students alternate in periods of approximately four months' duration, this period having been selected so as to enable cooperative students to take courses at the Institute of Technology in the regular terms of the Institute and with the established classes of the Electrical Engineering Course. These students receive much special advanced instruction at the Institute.

While working in Lynn the cooperative students receive compensation as regular employees. The first two of the three years of cooperative work include instruction at Technology which is substantially similar to the junior and senior years of the Electrical Engineering Course at the Institute, and also give important experience in machine work, insulating, drafting, designing, testing and administration at the works. The last year of the cooperative course is given up to special research problems at the works and advanced instruction in the courses leading to a Masters' Degree at the Institute; and after the course is completed, the students who have successfully completed it are to receive the graduate Degree of Master of Science.

## YALE WILL ADD NAVAL TRAINING TO COURSES

France Sends Battery of 75's to Class in Artillery

NEW HAVEN, Sept. 17.—Yale will inaugurate a course in naval training for its students beginning with the

opening of the college year next month, it was announced today after a meeting of the university corporation. The course will prepare students for the position of ensigns in the United States navy and will parallel the course in artillery training started last spring to train students for commissions in the artillery branch of the United States army service.

The students will be allowed to take a three years course to fit themselves for either army or navy commissions, the former course having been cut down one year by the addition of extra work. It was also announced today that the French government had sent to Yale a battery of four 75-millimetre guns with all accessories for use in the training at Yale and that the United States war department was to furnish other artillery equipment as well.

Yale professors who have taken special work to fit them to teach artillery and naval subjects will assist United States army and navy officers in the courses.

## SWING QUEBEC BRIDGE SPAN TOWARD POSITION

Engineers Profit by Tragic Experience Last Year

QUEBEC, Ont., Sept. 17.—With 122 feet yet to be negotiated before it is bolted into place above the St. Lawrence river, the huge central span of the Quebec cantilever bridge tonight is suspended like a great pendulum 28 feet above the point from which it was started upward today. An official statement said that so far the tremendous engineering feat had gone on without a hitch.

The span is being elevated two feet at a time, in contrast to the three-foot lifts which marked the first attempt to raise a span into place in 1916, when 14 lives were lost as it broke from its moorings in mid-air and plunged into the river.

Profiting by the disaster of last year, the engineers have introduced all possible precautions against a recurrence, and as evidence of the care with which calculations have been made, it was stated that the 5000-ton mass of metal varied only five-eighths of an inch from the computations as to how far it would bring down the cantilevers after the scows had floated.

Thousands of people lined the river banks when the span was moved on scows from Sillery Cove to the bridge

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site, and a great cheer went up when the hoisting chains were fastened in place and the scows slipped from beneath. The span swayed a few moments, lurching downward as the cantilevers bent under the tremendous weight, but soon became still. All day long throngs watched the operations.

The engineers estimate that the 75-foot mark will be reached tomorrow if the same ideal weather conditions prevail.

## EXPECT RECORD FRESHMAN CLASS AT BOSTON COLLEGE

Count on Enrollment of 300 Despite the War

The freshman class of Boston College this year bids fair to eclipse all previous ones numerically. Yesterday, registration day, more than 200 applied for entrance at the administration building and today it is expected that another 100 will apply. This will make the class of 1921 the largest entering class in the history of Boston College.

Today the members of the Sophomore, Junior and Senior classes will return and will be assigned to their various sections. A short session will be the order of the day. Regular class will commence tomorrow at 9.30 o'clock.

The Senior and Junior classes this year will be considerably depleted. Of the 280 Juniors and Seniors which would otherwise be back, it is estimated that practically 50 per cent have joined the colors. The remaining Seniors and Juniors are almost without exception, under the draft age. The Sophomore and Freshman classes will be composed of boys from 16 to 18 and 19 years of age.

## DESPONDEST MINER TAKES LIFE AT SUMMER RESORT

KINGSTON, Sept. 17.—The body of Richard C. Harrison '99, of Braintree, a mining engineer, who had been spending the summer here, was found today in the harbor channel, fastened to the anchor line of a dory.

The medical examiner, Dr. Edgar D. Hill, decided that the man had committed suicide by plunging overboard from the boat after binding the anchor to his body.

## NAVY SATISFIED NO HOSTILE SUBMARINES ARE OFF COAST

WASHINGTON, Sept. 17.—Officials of the Navy Department today announced that they are satisfied that no hostile submarines are operating off the New England coast. This announcement followed the most complete and searching investigation.

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## SHIP MASTERS LEARN HOW TO DODGE U-BOATS WHILE IN PORT

Practice in Evading Submarines Given with Captured German Craft

NEW YORK, Sept. 17.—A training school for captains and officers of merchant ships, the equipment of which includes a captured German submarine and a special steamship armed and rigged with the latest devices for fighting U-boats, has been established at a British port, according to a steamship officer who recently arrived here.

Details of the methods used in training are kept secret, but every captain and first officer now in the British merchant and transport service as well as a number of officers from American ships have had a week or ten days of instruction.

The officers are sent to the school during the time their vessels are discharging or loading in England. They are given the opportunity of maneuvering the "school ship" against the attacks of the submarine and are taught the use of devices of escape. The submarine is also manned by merchant ship officers whose object is to register a hit on the steamer, with dummy torpedoes, learning in this way by personal observation the U-boat's limitations, such as speed, time required to rise to the surface and submerge and how torpedoes are fired. The use of the captured German submarine makes their experience all the more valuable.

## OPEN COLUMBIA MEDICAL SCHOOL DOORS TO WOMEN

NEW YORK, Sept. 17.—The College of Physicians and Surgeons—the medical school of Columbia University—has opened its doors to women, receiving them, after 100 years' existence as an institution for men on equal footing with male students.

A gift of \$30,000 from George W. Brackenridge of San Antonio Tex. has made it possible to construct a new building to accommodate classes for women of whom many have enrolled as students.

### TO ALL CLASS SECRETARIES

Let us hear from you about the members of your class.

Every item of news about a Technology man is of interest.

## SCIENTIST AND LAY OBSERVER CLASH OVER PRANKS OF SOUND IN GUNFIRE

Advance Different Explanations for the Two Distinct Explosions Heard When Artillery Are Hurling High Velocity Shells

(From the New York Tribune)

THE peculiarities of gunfire as it reaches the ear are the subject of an interesting discussion in the columns of "The London Times." Facts and theories are commingled, and, as to the latter, there is room for debate. The apparent vagaries of sounds produced by the firing of high-velocity guns are established beyond question.

The most striking point which all observers agree upon is the double sound coming from gunfire. In the first letter to "The Times" raising this point the correspondent, who was eighteen months in the trenches, thus described the phenomenon:

One of the most wonderful, and, indeed, majestic of all sound phenomena in connection with artillery—but which I have never seen described or even referred to, as, when first heard, the novice is unable either to explain it or decide upon its nature, and afterward the ear becomes so used to it that it passes unnoticed—is the great "roll" that follows the discharge of a high-velocity gun. To hear this at its best one must visit a part of the front where the contour is rugged, or where the landscape is well wooded and where houses and other excrescences are abundant, as at Arras. The report of the cannon is followed at once and continuously by a majestic echoing roll that may be compared to a mixture of thunder and the music of a mighty bass orchestra.

This observer unquestionably gives an accurate description of what he heard, for his account agrees with that of many other soldiers. But his explanation is another matter. His surmise was that the first sound came from the actual explosion and the second, the "roll," was a chain of echoes. For this he was promptly taken to task by a scientist, who pointed out that the second sound was in truth the sound of the explosion and that the first and sharper sound was produced in the air by the traveling shell. To give his explanation in detail:

First, for the facts, which any one who cares to walk across the line of fire of one of our 18-pounders, or, better still, a 60-pounder, can easily verify. The sound produced by a high-velocity gun, as heard in front of the piece, is double, consisting of a sharp crack, which is very distressing to the ear, followed at an interval (which for the 60-pounder may be two or three seconds if the listener is in the line of fire) by a dull boom which is the true sound of the firing of the piece. This boom is a much duller and heavier sound which shakes buildings but does not hurt the ear. The sharp crack is not produced by the gun directly, but by the shell during its flight, and then only if the initial velocity of the shell exceeds that of sound, as is the case with all modern guns.

The double sound is never heard with a howitzer, where the velocity of the shell is low. The interval between the two sounds is greatest in the line of fire; as one walks to a flank it becomes less and less, until finally only one sound, that of the gun itself, is heard, the same sound that is heard behind the gun.

The phenomena are, of course, complicated by echoes, the whistle of the shell which reaches one from other points of its path after the crack, and other such minor things.

To go back to the original observer, the interesting point is made by him that to a listener behind the British guns the sound of the German guns is the louder and the sharper. When approaching the firing line before a big attack the sound of the German guns predominates, giving the soldier the apprehension that the enemy's artillery is in superior strength. On passing the British guns the appearance is reversed. The writer considers that the Germans invented the term trommel-feuer to describe the British artillery massed on the Somme for exactly this reason. To the Germans the British gunfire came as sharp staccato notes, the whole giving the impression of the rat-tat-tat-tat of a mighty drum. To the British behind their own guns there was only a dull and heavy roar. Of course, this phenomenon is also explainable on the theory of the traveling shell's producing a sharp noise which, by reason of the high speed of the projectile, reaches the observer before the sound waves of the first explosion.

Other correspondents raised the interesting question of sound zones. A South African gunner officer declared

that while in France he frequently found that during a heavy bombardment he could not hear it at a certain distance, yet if he went further back he could hear it distinctly. Most strikingly on the Somme he was thirty miles behind the line, and could hear nothing, though he knew the bombardment was taking place. Going to a village eight miles further from the front, the sounds came clearly. It was his notion that the ground transmitted the vibrations in this intermittent fashion, and this opinion was backed by a chorus of correspondents who related a great variety of parallel experiences. A clergyman at Rushall, in Kent, related that a gravedigger at the bottom of a deep grave reported that the sound of the guns was tremendous as compared with the sound above ground. A woman declared that, lying at full length on the top of Blackdown Hill, Sussex, she distinctly heard the bombardment of June 24, whereas her companion, standing, heard nothing.

The scientists who have replied to these observers place less faith in the ground theory as a general proposition. The established facts of sound zones at sea have been satisfactorily explained on the theory of air strata of varying temperatures which distort the sound waves aloft and away from the surface so as to skip over certain areas. The soldier in a dugout, like the gravedigger, may receive sound vibrations from the earth. The observers in the open air are another matter—despite two famous cases cited in "The Times" by Wynnard Hooper, whose father wrote "Napoleon":

On the morning of the Battle of Waterloo Marshal Grouchy, with several of his staff, was in a house at Sart-lez-Walhain at about 11.30 a. m. My father in his "Waterloo" (Chapter IX), says that Grouchy had just set off a dispatch to Napoleon announcing his position and what he proposed to do, when one of the staff walked in from the garden and reported that a cannonade was audible toward the west. My father goes on to say: "Grouchy, Gerard and several officers walked into the garden and listened in silence. Some of them placed their ears to the ground, and thus detected plainly the muffled boom of distant guns." I have no doubt that other similar instances could be met with in military history. But we may go back to the days of Shakespeare for evidence of common knowledge of the fact that ground conducts sound well. In "Henry IV," Part I, Prince Hal, when he and Falstaff were taking part in the "Gadshill robbery," thus addresses the fat knight: "Lay thine ear close to the ground and list if thou canst hear the tread of travelers."

The politician with his ear to the ground might also be placed in evidence. But he is hardly scientific. The vagaries of sound in the air are strange enough without adding imaginary transmissions through the earth.

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## PUBLICATIONS

The Annual Catalog (issued in December), the Report of the President and the Treasurer (issued in January), the Programme (issued in June), and circulars in regard to Admission of Students from other Colleges; Summer Courses; Advanced Study and Research.

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## ALUMNUS IN FIELD SERVICE DROVE AMBULANCE AMID RAIN OF SHELLS

Letter From Institute Recruit Decorated With  
Croix de Guerre Relates Many  
Narrow Escapes

MANY of the thrilling experiences through which drivers for the American Ambulance in France pass are narrated in a letter received from James M. White, whose home is at 970 Park avenue. His brother is Victor White, the artist. The fact that Mr. White has been decorated with the Croix de Guerre was reported in the cable despatched on Monday. His letter follows:

"So many things have happened since my last letter that I hardly know where to begin. Also, I am pretty tired out, so please excuse this letter if it is rather incoherent. We have been working our present posts now for three weeks and often it has meant forty-eight hours steady. Not only has it been hard work but it has been most exciting. One of the boys who has been always with the section says that never has he seen such all round hard and exciting work. It is practically over now, and we will all be very glad to go on repos.

"You have seen by the papers of around this date what a successful attack the French have made. Out of the numerous sections of the ambulance we have the honor of doing the hardest work, and it has been well appreciated, for letters have been written to the General about it. That probably will mean a citation for us.

### "This Work is no Play"

"When I write you about what we have gone through I do it, not for personal reasons, but because I want you to know that this work is no play, and far from being an occupation of the 'semi-heroic rich.' I have seen more of war in five minutes in this section than in months in the other places we have been. Nine of our twelve cars have been hit, but luckily only one chap has been wounded, and that not very seriously. I really think there is a divine Providence watching over us, for you would hardly believe some miraculous escapes that have taken place.

"I have seen demonstrated something which I had heard but never believed; namely, that a shell can land so close that its proximity saves one, the éclats going over one's head. Shells play queer tricks at times. Three cars were standing in a row, one with two wounded. A shell landed near and the concussion blew whole panels out of each car and killed the two men. The remarkable part is that neither the cars nor men were actually hit by anything but dirt.

### Germans Have New Gas

"Nowadays the Germans seldom send over waves of gas. They seem to prefer to send in hundreds of gas shells. These have the same whistle as the high explosives, but do not explode with a loud noise. It is more like the opening of a gigantic ginger ale bottle. They do a lot of damage, for they often catch one unawares. They will pick out a hollow and just drench it with gas shells, some smell like garlic and others like mustard. We have found it impossible to drive at night with masks on especially those of us who wear glasses, for they immediately fog up. All of us dread these shells, much preferring to take our chance with the high explosive. A soldier was telling me of a new gas that they send in by shells. Wherever there is a perspiration on the body it forms an acid which gives a very bad burn. Then men suffer most around the necks, under the arms and on the hands.

"Altogether, this has been a tremendously interesting period. The serial activity has been intense, there being lots of fights and numerous captive balloons brought down. The Germans have a nasty habit of coming over at night, flying low and turning their mitrailleuse on the roads which they know are crowded with wagons carrying material.

### Munitions Depot Hit

"By a lucky shot the other day the Germans started a fire in a small munitions depot quite close to us. I have seen displays of fireworks, but this has them all beaten with a four hours' display. Some of the abris up front are perfect marvels of safety and comfort and I shall try and give you an idea of one. One side of a solid stone hill had been used before the war as a quarry. This particular side happened to be away from the Boches. It has been so tunnelled that one walks through cave after cave with plenty of head-room and spacious rooms. Everywhere there is plenty of light supplied by an electric generator and one finds a wonderfully complete and clean, operating room. Remember this is all within a mile and a half of the front line trenches, which in modern warfare is a short distance.

"The wounded get splendid treatment; but of course stretchers take the

place of beds, for it is by no means a hospital. They can comfortably take care of 200 men and, mind you, all of this has been cut out of solid rock. At such a post we get the men and take them back to the field hospital, where they may again be sorted for transport to the hospitals further back.

### Treat Enemy Wounded.

"We carried quite a few German wounded yesterday and it is very interesting to hear their ideas about things in general. Most of them seem to be in great perplexity about why we declared war. Some of them seem like mere boys and others quite old, but then that holds for all armies.

"It is almost a month since I heard from America, but then I know how busy you all must be with the moving. Please tell Tom that the second package of tobacco has come and I am ever so grateful. I lost my passport but have another. I had to have new pictures taken and walked all over Paris on a hot day to find a place, hence the expression. JAMES M. WHITE.

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### Personal

Among the callers at the Washington Office during the past few days have been:

Dudley Clapp '10, and A. H. Waitt '14, who have applied for lieutenantcies in the Sanitary Corps, for service in the gas division.

H. N. Keene, '17.

Major O. W. Albee '93, OORC, who is ordered to New York.

J. B. Stewart, Jr., '08.

R. B. Pendergast '02.

C. P. Fiske '14.

F. C. Harrington '11.

Dr. W. T. Sedgwick, of the Department of Biology and Public Health.

I. Weil '94, in connection with Ordnance steel production.

H. P. Gray '1, Secretary of the Akron Club.

1st. Lt. D. F. Denbow, OORC, has been ordered to Washington for duty.

### Chemists Needed for Gas Work

The work on gas defence, which has been carried on at the Bureau of Mines, has so far progressed that the Army Medical department is now ready to use chemists and men expert in the handling of gases and gas research, in the sanitary corps. The military organization is under the charge of Major Bradley Dewey '09, who says that the services of at least one hundred fifty chemists will be required shortly, both for laboratory research and field work. Chances for a commission are excellent if the candidate demonstrates his fitness for the work. Men interested should communicate with Major Bradley Dewey, Bureau of Mines, Washington, D. C.

### Navy To Examine Civil Engineers

An examination will be held at the navy Department, Washington, D. C., to fill the ten existing vacancies in the grade of assistant civil engineer, Corps of Civil Engineers, N. S. N. No candidate over twenty-six years of age on July 1, 1917, will be eligible. He must be an American citizen must have received a degree from a college or university of recognized standing, showing that he has satisfactorily completed a course in civil, electrical or mechanical engineering; must have had not less than fourteen months' practical professional experience since graduation and must be of good moral character and repute. Appointees are commis-

sioned assistant civil engineer, with rank of lieutenant (junior grade). pay and allowances approximately \$2,500 a year. The Corps of Civil Engineers is a growing one and its position in the Navy organization is one of prominence. New construction authorized and underway aggregates over \$100,000,000. A descriptive circular regarding the Corps and the coming examination will be mailed to those interested upon request to the Chief of Bureau of Yards and Docks, Navy Department, Washington, D. C.

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